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FOREST INSECT INVESTIGATIONS

ELLOPIA INFESTATIONS WITHIN THE INLAND EMPIRE 1937

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By
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Entomologist

Forest Insect Laboratory
Coeur d'Alene, Idaho
February 19, 1938

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FOREST INSECT
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Introduction

Early in July 1937 throughout the forests of northern Idaho and western Montana the trees on many areas of fir and intermingled tree species began to turn brown as though scorched by fire. This discoloration of foliage continued to increase in severity until the areas of brown trees were observed by all forest visitors and became the subject of considerable discussion.

A closer examination revealed myriads of caterpillars or "loopers" feeding upon the foliage of the discolored trees. The adults of these caterpillars were subsequently determined as Ellopia fiscellaria lugubrosa Hlst., which is no doubt a variety of the "hemlock looper" of the Pacific Coast. Though the hemlock looper is considered as probably the most destructive insect enemy of the Douglas fir and hemlock forests of western Oregon and Washington, this is the first available record of a "looper" epidemic within the Inland Empire.

Description of Insect

This insect belongs to the Lepidopterous family Geometridae, the larvae or caterpillars of which are called "looper" or "measuring worms". These common names and others are derived from the peculiar looping motion employed by the caterpillars in traveling. There are a large number of different species of Geometrids which feed upon a

variety of host plants.

The eggs are small, green objects attached to all portions of trees and shrubs within the infested area. When full grown the hairless, slender caterpillars are from 1¼ to 1½ inches in length. Their color varies from pale green to brown, with a series of dark, wavy lines along the sides of the body. The pupae, or chrysalids, are greenish brown in color, about ½ inch in length, and are secreted in available hiding places on the trees and forest debris. The adult moths are delicate, fragile creatures of a light fawn or buff color, with a wing expanse of about 1½ inches. There are two irregular, transverse darker lines across the primary or forewings and one across the smaller secondary wing.

Seasonal History and Habits

There are four stages in the development of this insect, namely, egg, larvae or caterpillar, pupae or chrysalids, and adult moths. Eggs laid the previous fall hatch during May and June, and the young larvae feed upon the tender needles of the new growth. During this early period of feeding the entire needle is not consumed but is injured sufficiently to cause it to die and turn brown. This discoloration of the new foliage occurs during July, at which time the defoliated areas become noticeable. As the larvae develop in size they leave the new growth and start feeding upon old foliage, and it is during July and August that the heaviest defoliation occurs. When disturbed or seeking

a place for pupation the caterpillars lower themselves on silken threads. During severe epidemics infested trees are actually veiled with silken shrouds, and the forest becomes a mass of webs. The larvae become full grown during the latter part of July and early September, at which time pupae or chrysalids are formed in which the transformation to new adults occurs. Chrysalids are concealed beneath moss on the tree trunk or limbs, in bark crevices, or under bits of forest debris. Pupation continues through most of September, with adult moths being in flight during the latter part of the month and most of October. Eggs are deposited during this period which overwinter and hatch the following spring.

During the past season the moths were present in countless numbers, with the peak of the emergence occurring the latter part of September. The disturbance of a tree would start clouds of the fluttering moths into flight. In some areas the ground was actually white with their dead bodies, and small streams were even clogged and dammed. Reports were received of a very perceptible odor arising from the dead bodies of the adults, and the water from many streams was rendered unfit for drinking.

Though in this region the true firs seem to be the preferred host of this defoliator, all associated tree species such as Douglas fir, Engelmann spruce, hemlock, white pine, and larch were attacked. In the severely infested areas the foliage of all underbrush, especially huckleberry, was also destroyed. It is apparent that though

the true firs are the preferred host of this insect, a fact which no doubt determines the location of infestation centers, it is capable of feeding upon a variety of forest trees and shrubs.

Development of Present Situation

The looper epidemic, which threatens large areas of timber within the forests of the Inland Empire with destruction, developed with little warning as to its existence. Though in 1936 the adults were observed in such numbers as to cause considerable interest, the feeding of the caterpillars prior to the development of the moths was not sufficiently severe to attract attention, and no reports of defoliation were received. Future occurrences of these moths can be taken as indicating the development of an outbreak, with severe defoliation to occur the following season.

Though no records of previous collections are available, this insect is believed to be indigenous to this region, with some ecological disturbance contributing to the development of the general outbreak. The "blow-up" of so many spots of infestation over such a large territory, as well as the presence of parasitic enemies, would seem to point to this belief and to eliminate the thought of the insect having but recently spread into the infested territory.

1937 Situation

During the past season 57 spots of severe "looper" defoliation were either reported to the Forest Insect Laboratory at Coeur d'Alene, Idaho or were observed by its officers. These areas, which varied from

a few acres to several thousand, were for the most part along ridge tops, conforming to areas of true fir types. The areas reported represented only severe defoliation and did not include the light attacks reported as scattered throughout entire ranger districts. The spotted distribution of the outbreak would indicate that there could be other areas of severe defoliation which were not recorded.

A detailed description of all known areas of looper defoliation follows, with their approximate location shown on plate I.

Kaniksu National Forest

Light defoliation by "loopers" occurred throughout the east portion of the forest. There were heavy spots of infestation on upper Priest Lake and along the ridge east of Priest Lake.

Coeur d'Alene National Forest

Severe infestations of the "looper" were reported from Jackknife along Crooked Ridge, Lookout Ridge, Monument Peak, ridge between Skitwish Peak and Cooper Mountain, Bumblebee Peak, Teepee Summit, Spyglass Peak, and an area at the head of Pine Creek south of Cataldo.

St. Joe National Forest

An infested area of 50,000 acres was reported from the Roundtop ranger district. In the St. Maries ranger district the Middle Fork of the St. Maries River; heads of Lines, Norton, and Olson Creeks; and the West Fork of Merry Creek are reported as being severely defol-

iated by loopers. Infestations are also distributed throughout the Pole Mt. district, with the heaviest defoliation along the Clearwater-St. Joe Divide between Hart's Pass and Collins' Peak, and on the ridge between Ward's Peak and Black Jack L. O. Scattered infestation, with heavy defoliation on south side of St. Joe River, are recorded from the Avery district.

Clearwater National Forest

Severe "looper" outbreaks were reported as occurring at Moose City, Fly Camp, Independence Creek, and Lake Creek of the Kelly Creek district, and from all timbered portions of the Bungalow and Canyon ranger districts. The Lochsa district reports infestations on Obia, and in the Musselshell district similar conditions exist on the heads of Yoosa, Obia, Middle, Hemlock, French, and Orofino Creeks.

Lolo National Forest

Only two areas of "looper" defoliation were reported from the Lolo, one being along the ridge near the Lost Lee Lookout, and the other on Marshall Creek near Seeley Lake.

Cabinet National Forest

The Cabinet reports outbreaks of the "looper" distributed throughout the Saint Regis district, on Big Beaver Creek, and on the North Fork, Middle Fork, and South Fork of Bull River.

Kootenai National Forest

One area of "looper" infestation reported from the Kootenai

on the head of Bowan Creek.

Flathead National Forest

Two infested areas are reported from the Flathead, one on Beaver Creek and Lindbergh Lake, and the other in the Mission Range south of Big Fork, Montana.

Glacier National Park

One "looper" infestation reported from the Nyack region of the Glacier Park.

Future of Present Epidemic

With no records of previous outbreaks upon which to base a prediction, it is difficult to foresee the future of the present "looper" epidemic. The countless millions of moths which were present last September would seem to assure a plentiful supply of overwintering eggs for the 1938 larval population, with severe defoliation to follow.

As in the heavy centers of infestation there is but little foliage left upon the preferred host plants, a question arises as to the importance of this source of food supply to the continued life of the outbreak. Though in areas which were severely defoliated in 1937 there will undoubtedly be a high larval mortality due to a shortage of food, it is not known how successfully the caterpillars can subsist and develop upon other adjacent hosts. If the preferred source of food is essential to the continuation of this epidemic, one

may expect a material decrease in the insect population during the coming season. If, on the other hand, the caterpillars can subsist and successfully mature on other available species of trees and shrubs, the economic aspect of this situation is more serious.

Large numbers of a dipterous parasite (Phrynolydella n. sp.) were present within at least some of the areas last fall, and a hymenopterous parasite (Itoplectis montana Cush.) was reared from the caterpillars. Though it is expected that these beneficial insects will reduce this epidemic to a normal status, the period of time required for such an adjustment is not known, and serious losses may occur before it is accomplished. In many instances there are uninjured fir stands adjacent to the epidemic areas which may absorb subsequent defoliation until this balance is restored.

The destruction of timber which is to follow this epidemic obviously depends upon the severity of subsequent defoliation. Though a large percent of the trees will recover from the present injury, they will not withstand continued defoliation.

Control

Though subsequent timber losses may more than justify such action, the control of these many outbreaks would be a difficult and expensive operation. In contemplating artificial control of this insect, the only known method is the application of stomach poisons

to its food plants. This poison could be applied by spraying from the ground or by dusting from the air. The areas along forest roads, and it would seem that there are a number of them, could be sprayed, though the inaccessible territories would need be dusted from the air. In considering the possibility of these projects such difficulties as water for spraying, nature of terrain to be dusted, etc. must be contemplated. Autogyros might be adapted for aerial dusting, but it is doubtful if airplanes could be successfully used for this purpose due to the necessity of flying close to the tree tops over rough, mountainous country.

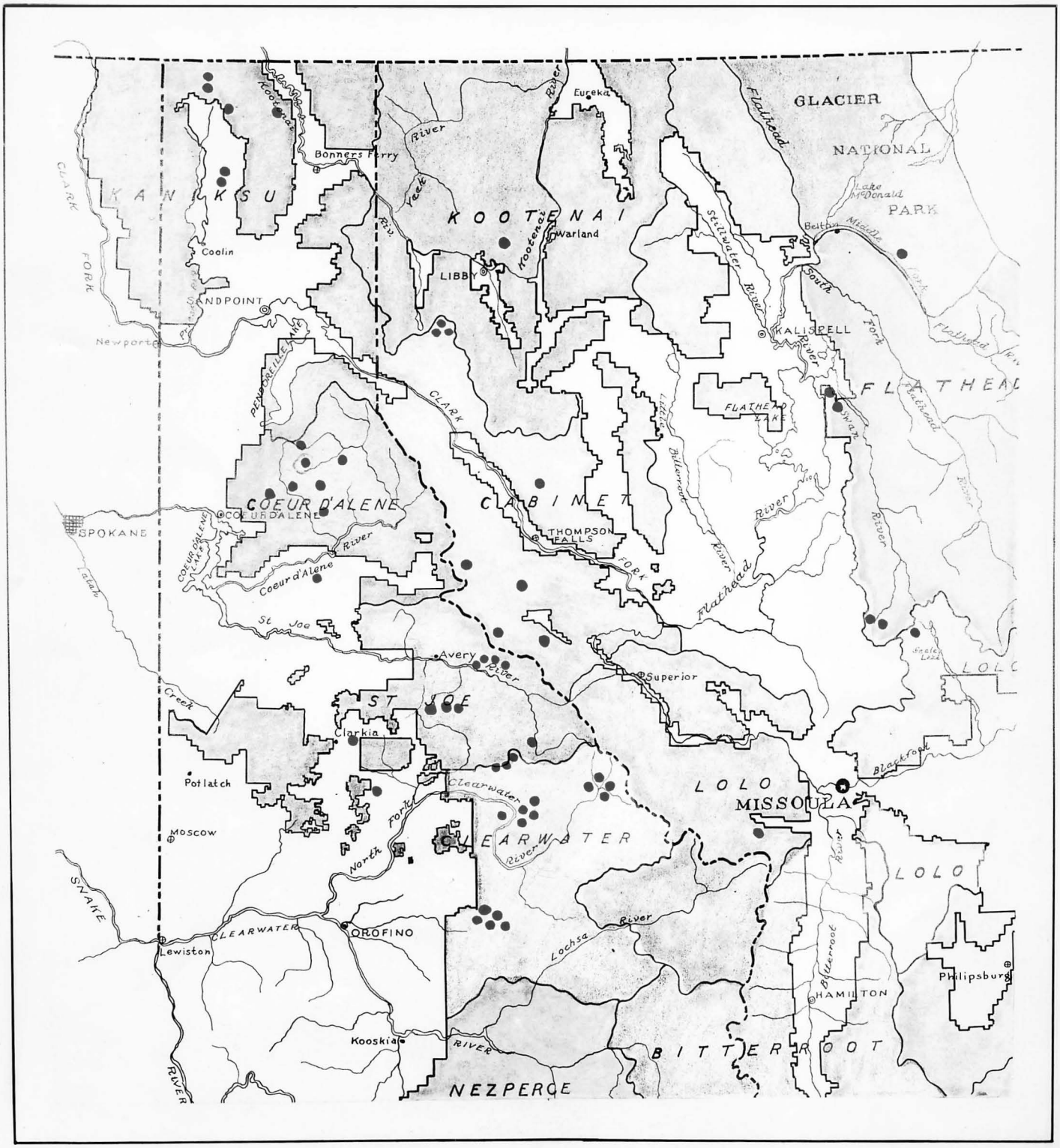
In planning for the institution of control only those areas adjacent to more valuable timber stands of another species would need be treated.

Conclusion

In summarizing this report of "looper" infestations within the Inland Empire no prophecy can be made with any degree of assurance as to the destruction of timber which is to follow. Though earlier in the season it was believed that little if any damage would result from this outbreak, after studying the data which are now available one must be apprehensive of what the coming season may hold in store.

Respectfully submitted,

James C. Evenden
Entomologist


KANIKSU
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CLEARWATER
LOLO
NEZPERCE
BITTERROOT
FLATHEAD
GLACIER NATIONAL PARK
Eureka
Bonners Ferry
Warland
LIBBY
Coolin
SANDPOINT
Newport
KALISPELL
FLATHEAD LAKE
COEUR D'ALENE
SPOKANE
COEUR D'ALENE LAKE
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Moscow
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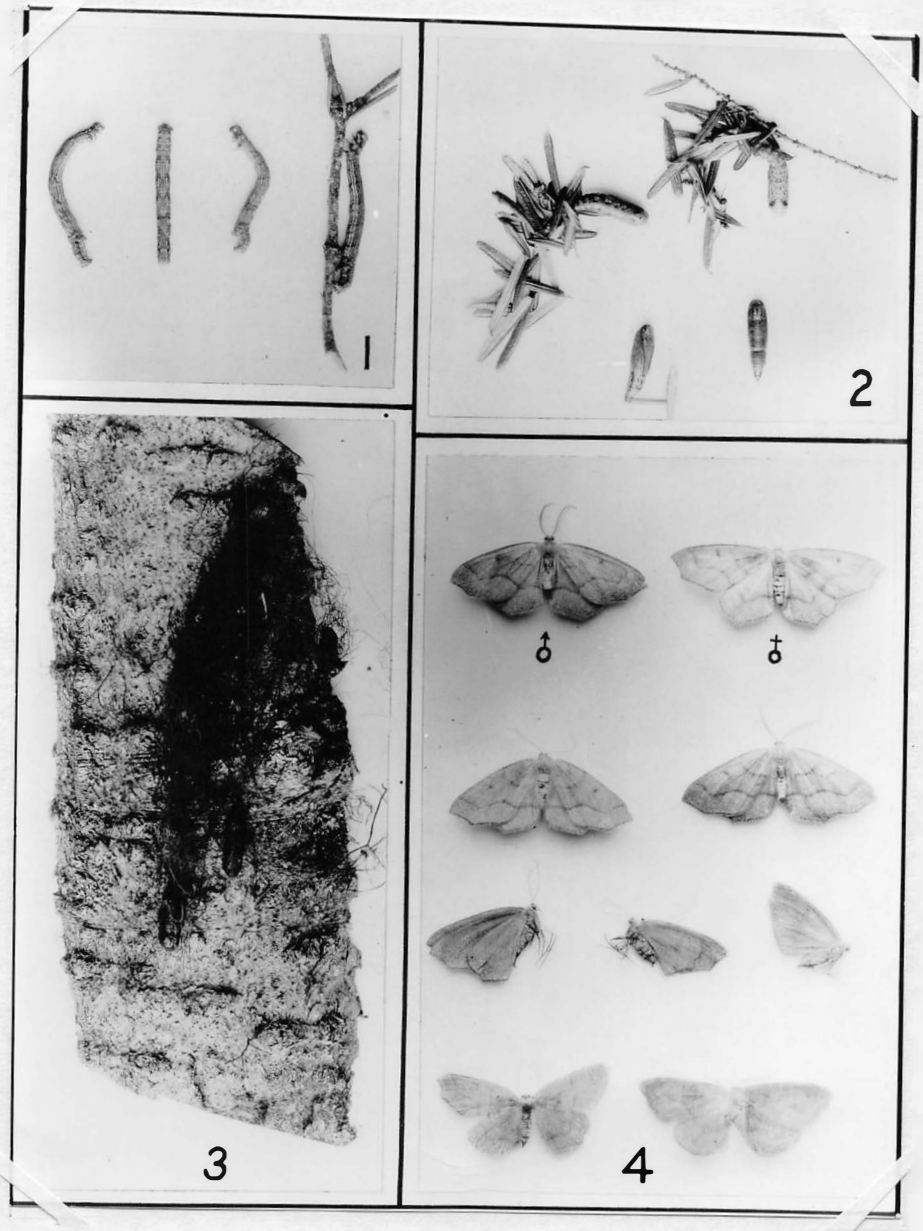
Blackfoot
OROFINO
Lewiston
Kooskia
HAMILTON
Philipsburg
Lochsa River
Flathead River
Clearwater River
North Fork
St Joe
Coeur d'Alene River
Kootenai River
Yaak River
Clark Fork
Pend Oreille Lake
Stillwater River
South Fork
Middle Fork
Swan River
Bitterroot River
Lake McDonald
Snake River

Dead adult moths
St. Joe National Forest

Small stream dammed
with dead adult moths
St. Joe National Forest



Ellopia fiscellaria lugubrosa Hlst.

1. Caterpillars
2. Chrysalids
3. Concealed chrysalids
4. Adult moths

Looper webs in white fir--Crooked Ridge,
Coeur d'Alene National Forest

Looper infestation on Crooked Ridge, Coeur d'Alene National Forest. Photograph taken July 27, 1937 prior to the destruction of old foliage, but shows discolored new growth following injury by young caterpillars.